Tip Sheet

Choose the Best "Slump" for the Job

Problem:

In its simplest form, concrete is a mixture of paste and aggregate (sand and rock). The paste, composed of cement and water, coats the surface of the fine (sand) and coarse aggregates (rocks) and binds them together into a rock-like mass known as concrete. This mixture and the ratios are critical to the workability, integrity and quality of the end product. The increased forces needed to screed/rod and rake can take their toll on the worker.

The forces required to spread concrete with different "slump" values increase with a lower slump. In other words, the lower the slump, the higher the required force. For example: with a 1" slump, the mean force to pull material with a rake was: 46 pounds. In comparison, a 3" slump required an average of 27 pounds and a 6" slump required 20 pounds. The differences in these forces will take their toll on the worker over the course of a work shift.

Repetitive, awkward, high force motions may eventually lead to lower back, shoulder and/or wrist pain and/or fatigue.

One Solution:

Reduce unnecessary work by using the appropriate slump for the job. If a mixture with a higher slump can be used, it will reduce the pulling forces required to rake the material.

A 6" – 7" slump required an average of 20 pounds of pull force.

Slump and pull force

A 1” slump is measured here

A 3” slump is measured here

With a 1” slump, pull forces averaged 46 pounds with the greatest force being 60 pounds and the least being 36. These forces through the course of a day can be hard on the back and shoulders.

With a 3” slump, pull forces averaged 27 pounds with the highest force at 34 pounds and the lowest at 23.

FACTORS:

- Low slump increases the forces needed for rodding/screeding and may encourage more back bending.
- Low slump increases the force needed to pull (rake) the material.

IDEAS:

- Always use concrete with the highest slump that will ensure quality and strength while at the same time, reduce unnecessary work.

Tip: Identify who is determining the level of slump and be sure that the highest number possible is being used.

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How does using appropriate slump affect productivity? When workers report feeling less tired at the end of the day they are more productive. Reducing the force required to spread concrete throughout the course of the work day will have a positive effect, is less fatiguing and is certainly safer.	.**Contact Information:** This Tip Sheet was sponsored by CPWR Agreement #1020-=005-56. It was produced by Build It Smart, LSHFNA, LIUNA, AGC of Washington, The University of Washington, The Western Washington Cement Masons Training Center and the StewartPrezant Ergonomics Group Contact: Build It Smart 360.596.9200 safetyhealth@aol.com